

Science Toolkit: Grade 7 Objective 1.D.1.d

Standard 1.0 Skills and Processes

Topic D. Technology

Indicator 1. Explain that complex systems require control mechanisms.

Objective d. Identify reasons that systems fail-they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.

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Design and Systems

Design Constraints

An idea to be developed in the middle grades is that complex systems require control mechanisms. The common thermostat for controlling room temperature is known to most students and can serve as a model for all control mechanisms. However, students should explore how controls work in various kinds of systems-machines, athletic contests, politics, the human body, learning, etc. At some point, students should try to invent control mechanisms, which need not be mechanical or electrical, that they can actually put into operation.

Introduction

Science Grade 7 Standard 1

At this level, students need to become more systematic and sophisticated in conducting their investigations, some of which may last for weeks or more. This means closing in on an understanding of what constitutes a good investigation and explicitly discussing how explanation relates to experimental design. Even though the main purpose of student investigations is to help students learn how science works, it is important to back up such experience with selected readings. Scientific explanation of the material world is built on theories and this is a good time to introduce a) an understanding of how theories are constructed and find both historical and modern examples of the theory development process; and b) an appreciation for the explanatory and predictive power of theories. By the end of Grade 8, children will have had multiple experiences applying and practicing all of the listed science skills and processes across the concept areas.